Theory of Computation

Homework 2
Due: 2008/11/04

Problem 1. Let $L \subseteq \{0,1\}^*$ belong to $\mathrm{TIME}(2^{(n^{10})})$ and $L' \stackrel{\mathrm{def}}{=} \{x\,0^{|x|^{100}} \mid x \in L\}$ where $x\,0^{|x|^{100}}$ denotes the concatenation of x and an $|x|^{100}$ number of 0's. Show that $L' \in \mathrm{TIME}(2^n)$.

Problem 2. Let M be a nondeterministic polynomial-time Turing machine with alphabet set Σ. For each $x \in (\Sigma \setminus \{\sqcup\})^*$, denote by $C(M, x)$ the set of configurations that can be yielded in any number of steps from the initial configuration of M on x. Suppose that A is a deterministic polynomial-time Turing machine that, given any $x \in (\Sigma \setminus \{\sqcup\})^*$, outputs a set $S(x)$ with $C(M, x) \subseteq S(x)$. Show that $L(M) \in \mathrm{P}$.